Myrmikan Research

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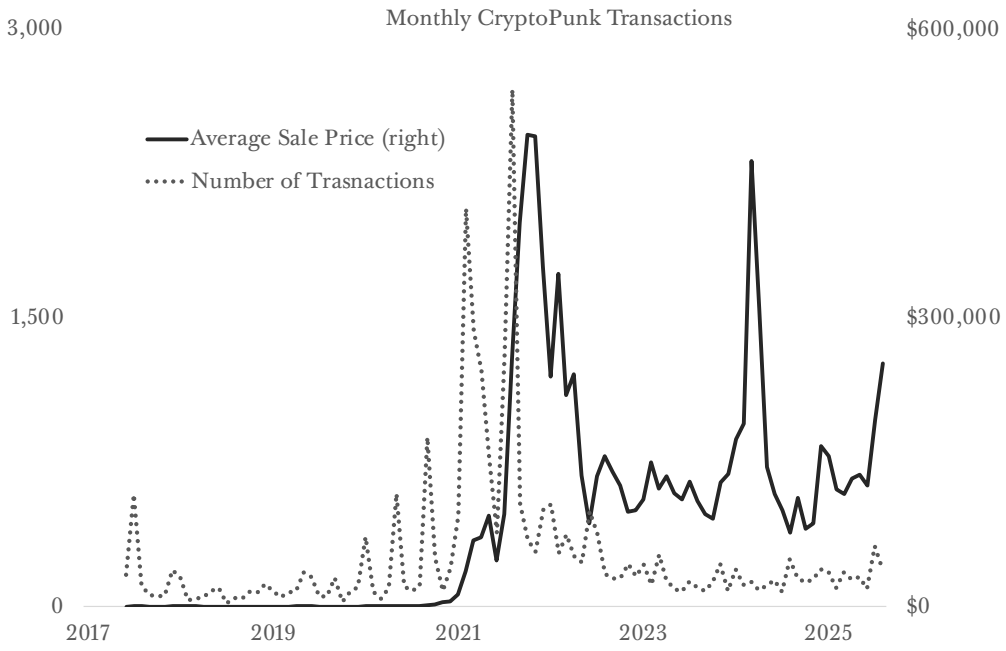
When the A.I. Bubble Bursts

Gold and gold stocks have surged in 2005, with gold up 78% year-to-date and the HUI gold miner index up 99%. While few investments have surpassed the precious metals this year, we do note that the S&P 500 is also making new highs, as is bitcoin, and Ethereum; Fartcoin is still worth $800 million, and one of our favorite bubble indicators, the CryptoPunk market, is rebounding sharply.



CyrptoPunks were one of the first NFTs (Non-Fungible Tokens), each a 24x24 pixel image with various attributes assigned algorithmically, making each image unique. CryptoPunks could be claimed for free; then a market sprang up to trade them. Jerome Powell's monetary blitz hit in conjunction with multiple rounds of COVID stimulus checks, producing a frenzy in CryptoPunk trading.

The top four transactions were priced between $3.3 million and $23.7 million—for an ownership record of an image of a small, ugly, pixilated hooligan. The fair use doctrine allows for an inherently useless object to be republished in most practical

circumstances, such as below, so it is not clear how any economic value could be ascribed to these bits of computer code beyond the absurd proposition that scarcity is the sole arbiter of value.

#5822
$23.7 million
12 Feb 2022

#7804
$7.6 million
11 Mar 2021

#3100
$4.5 million
28 Sep 2021

#2942
$3.3 million
15 Jul 2021

While sales prices are impressive, market depth is lacking. In 2024, for the four NFTs pictured above, the highest bid on #5822 was $16 (not $16 million but $16), #7804 had no bid but an ask price of $17.9 million, #3100 had no bid and an ask price of $16 million, and #2942 reported no bid or ask.

It strains credulity to imagine that any of these high prices were ever real, that is, between two discrete parties. The development of the NFT market was followed swiftly by the advent of NFT financing. Various crypto-venture companies allowed users to post their NFTs as collateral to borrow crypto-currency, which could then be converted into dollars. The ability to extract cash from bits of computer code created an obvious incentive for NFT owners to trade them back and forth at increasing prices to increase the value of the collateral they could post to NFT lenders. That some parties have found it again advantageous to mark CryptoPunks back up to an average price of $242,861 in August suggests there is still money flooding into the cryptouniverse to be extracted by the crafty; in other words, the world of Sam Bankman-Fried is alive and well.

We respect Bitcoin, Ethereum—and oddities such as Fartcoin and CryptoPunks— as fairly accurate measures of liquidity. But the locus of the current bubble is clearly Artificial Intelligence.

The first thing to understand about A.I is that it is not intelligent, as its very name admits: its "intelligence" is "artificial"—much like flight simulators are simulations: you can crash the plane and try again, lowering the stakes. A.I. is loads of fun as a toy, but its structure makes it wholly inadequate for critical applications.

The way ChatGPT works, according to computer scientist Stephen Wolfram, is it tries:

> to produce a 'reasonable continuation' of whatever text it's got so far, where by 'reasonable' we mean 'what one might expect someone to write after seeing what people have written on billions of webpages, etc.… And the remarkable thing is that when ChatGPT does something like write an essay what it's essentially doing is just asking over and over again 'given the text so far, what should the next word be?'—and each time adding a word.… At each step it gets a list of words with probabilities. But which one should it actually pick to add to the essay (or whatever) that it's writing? One might think it should be the 'highest-ranked' word (i.e. the one to which the highest 'probability' was assigned). But this is

> where a bit of voodoo begins to creep in. Because for some reason—that maybe one day we'll have a scientific-style understanding of—if we always pick the highest-ranked word, we'll typically get a very 'flat' essay, that never seems to 'show any creativity' (and even sometimes repeats word for word). But if sometimes (at random) we pick lower-ranked words, we get a 'more interesting' essay. The fact that there's randomness here means that if we use the same prompt multiple times, we're likely to get different essays each time.[1]

Wolfram's fascinating essay continues over many pages to explain in detail how Large Language Models (LLMs) choose each ensuing word—the layman may be content in the simple understanding that LLMs like ChatGPT are merely predictive algorithms trained on existing text—by its nature A.I. cannot innovate; it can only mimic that which already exists in digitalized textual form.

This does not mean that A.I. has no utility. Very few actors in the economy are called upon to innovate. A bank teller, for example, has a limited and definable number of actions available within the scope of his employment. A.I. seems an obvious means to relieve the bank or any other large consumer service organization of front-line expense.

Indeed, a study released last month finds that "since the widespread adoption of generative AI, early-career workers (ages 22-25) in the most AI-exposed occupations have experienced a 13 percent relative decline in employment even after controlling for firm-level shocks."[2] Dario Amodei, CEO of Anthropic, a developer of LLMs, believes that A.I. could eliminate half of all entry-level white-collar jobs and lead to 10% to 20% overall unemployment over the next five years.[3]

The problem should be obvious to anyone active in the world: except for the geriatric, customers call only when their problem cannot be easily addressed on the company's website, i.e., when they have a novel problem that A.I., by definition, cannot solve. But the prospect of reducing employee headcount has enticed large companies to shove A.I. down their customers' throats. CVS, for example, has just deployed a new phone system that prevents the caller from reaching a human pharmacist no matter how many times he slams the zero button (eventually CVS's A.I. will offer the persistent a voicemail option). Any A.I. cost savings will likely be matched by revenue loss.

If customer service does not lend itself to replacement by A.I., perhaps repetitive, low-value document-processing work would be more prospective. But A.I. is not yet succeeding in that field either: MIT published a report in July that reviewed 300 A.I. implementations across 300 public companies and concluded: "Despite $30–40 billion in enterprise investment into GenAI, this report uncovers a surprising result in that 95% of organizations are getting zero return.... What's really holding it back is that most AI tools don't learn and don't integrate well into workflows."[4]

A.I. tools do not learn because they cannot. Worse, the randomness in word selection—the "voodoo" that makes the models seem human—also causes A.I. to generated wholly fabricated output, so-called hallucinations. The randomness also explains why A.I. programs struggle with basic math, even though the computer on which the program is running is capable of extraordinarily precise calculations.

1 https://writings.stephenwolfram.com/2023/02/what-is-chatgpt-doing-and-why-does-it-work/

2 https://digitaleconomy.stanford.edu/wp-content/uploads/2025/08/Canaries_BrynjolfssonChandarChen.pdf

3 https://www.axios.com/2025/05/28/ai-jobs-white-collar-unemployment-anthropic

4 https://mlq.ai/media/quarterly_decks/v0.1_State_of_AI_in_Business_2025_Report.pdf

The market seems confident that the computer scientists can repair these critical design flaws. Microsoft is spending 47% of its capital expenditures on the Nvidia chips that make A.I. possible. Meta (Facebook) spends 25%, Alphabet (Google) 16%, Tesla 13%, and Amazon 11%. Apple is set to spend 8%. These combined budgets represent 43% of Nvidia's revenue.[1]

Nvidia, with its $4.2 trillion market cap, is the concentrated bet on A.I. But the other six big tech companies have become the same trade. And these seven companies, the Magnificent Seven, represent one third of the S&P 500. So goes A.I., so goes the market (and the babyboomers' retirement savings).

And A.I. isn't going so well. In addition to the MIT study on corporate deployment, one analyst estimates that the $560 billion that Magnificent Seven has spent on A.I.-related capital expenditures over the past eighteen months generated a mere $35 billion in revenue (not profit).[2] Insanity.

Unless, of course, A.I. has massive network effects like the P.C. operating system in which the winner takes all and in a technology that is doubling in power every eighteen months, as the microchip has from 1965. Moore's law (named after Intel co-founder Gordon Moore who noticed the doubling trend in 1965) is only now, sixty years later, starting to sputter.

Sam Altman, CEO of OpenAI, thinks the rate of growth previously constrained to microchips does apply to the current growth of A.I. In a piece titled: "Moore's Law for Everything," he argues that A.I. will take over "more and more of the work that people now do." If A.I. were indeed to double in power every year or so, and we assume it is actual (not artificial) intelligence, then predictions such as Amodei's become believable.

But there is no evidence that A.I. is following Moore's Law. The long-awaited GPT-5 was a disappointment. According to *The Information*, "the increase in quality was far smaller compared with the jump between GPT-3 and GPT-4." In fact, for some tasks the new versions showed negative progress. Apple published a paper in June reporting that the new versions of A.I., so-called Large Reasoning Models (LRMs), actually underperform LLMs at certain tasks: "We identify three performance regimes: (1) low-complexity tasks where standard models surprisingly outperform LRMs, (2) medium-complexity tasks where additional thinking in LRMs demonstrates advantage, and (3) high-complexity tasks where both models experience complete collapse."[3]

Another market challenge facing the roll out of general A.I. (as opposed to A.I. with ambitions limited to performing simple tasks, like replacing bank tellers) is that the programs have no moral compass or judgment. For example, the Anti-Defamation League points out that Amazon's A.I. produces rave reviews of notorious anti-semitic books.[4] NPR reports that X.com's new A.I. program "started calling itself 'MechaHitler'" shortly after a recent update and had to be shut down.[5]

The A.I. systems are just extending the text from the prompt by referring to existing patterns in a controlled but semi-random fashion—the wild results are endemic to what A.I. is—so in order to avoid political scandal, A.I. systems must now

1 https://finance.yahoo.com/news/big-techs-spending-drove-nvidias-rise-154027146.html?ref=wheresyoured.at
2 https://archive.is/mGNFO
3 https://machinelearning.apple.com/research/illusion-of-thinking
4 https://www.adl.org/resources/report/amazons-ai-recommends-antisemitism
5 https://www.npr.org/2025/07/09/nx-s1-5462609/grok-elon-musk-antisemitic-racist-content

incorporate algorithms to police results, which consumes resources and reduces efficiency. To force an analogy back to Moore's Law, it would be as if the doubling of transistors produced some kind of static that required ever greater efforts to inhibit: the technology might allow the doubling of transistors to continue, but the added costs would cause productivity gains to dwindle. Moreover, the police mechanisms undermine the very theory of A.I.: the more the programs produce managed results, the less claim they have to being intelligent and trustworthy.

If A.I. improvements are not following Moore's Law but instead an S-curve—that is, first an accelerating rate of development, then high but constant growth, then a flatting of the rate of improvement—and the technology has already reached the third stage, much of the investment in Nvidia's chips will be impaired as well as the value of the Magnificent Seven.

And even if we assume that A.I. can be structurally redesigned to retain the randomness yet filter out the hallucinations and block offensive output, value requires the control of a bottleneck. Microsoft offers a classic example: Computers are a giant collection of transistors, useless without an operating system. Microsoft used aggressive tactics (not technological prowess) to become the dominant system; software developers preferred to write their programs for one system, not many, and customers could share the products of those software packages only with others on the same operating system—a natural monopoly was the result (Steve Job's vastly superior design was able to expand the market to a duopoly).

Netscape, the first successful commercial internet browser, was a mortal threat to Microsoft because the browser itself could run Sun Microsystem's Java operating system on any computer running any operating system, potentially breaking Microsoft's strangle-hold. Netscape distributed its browser for free because co-founder Marc Andreessen believed: "It's basically a Microsoft lesson, right? … One of the fundamental lessons is that market share now equals revenue later … whoever gets the volume does win in the end. Just plain wins."

The stock market applauded the strategy: though Netscape's revenues in the second quarter of 1995 were only $12 million, the IPO that August valued the company at $2.2 billion. The "Microsoft lesson" was completely inapt. Anyone could develop a competing browser. Microsoft quickly did so and demanded computer manufacturers ship its inferior Internet Explorer pre-installed in their systems. America Online paid $4.2 billion for Netscape in 1998 and shut it down six year later.

Netscape is a glaring example of how utility and value are distinct concepts: Netscape's browser was very useful, the best on the market, but the company—unlike Microsoft—did not control a bottleneck and so had little economic value. The Netscape lesson is one every bubble investor eventually learns. Earlier versions included the nineteenth-century railroad boom: three competitors would build three rail lines between two cities—the rails were very useful, but overcapacity meant they had little value; the crash would invariably bankrupt two of them, if not all three.

It is not obvious how the A.I. companies pull a Microsoft instead of a Netscape to justify to justify the enormous expenditures of capital. If scale measured by the volume of Nvidia chips available to the A.I. program were the only resource that determined success, perhaps an unassailable victor would emerge through exhaustion of competitive capital; this is why the Chinese DeepSeek news was so disturbing—that model was able to produce nearly similar results with vastly less infrastructure. To the extent that A.I. turns out to be useful only in various, discrete applications, a

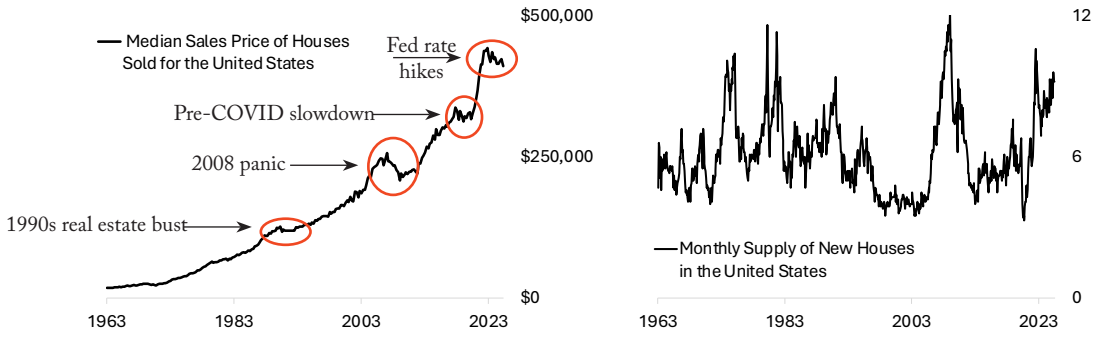
fractured market would be the natural result. To the extent that A.I. development faces diminishing returns, the economic prize is correspondingly smaller.

The tech companies' burning hundreds of billions through malinvestment in A.I. will harm especially retirees who fund their lifestyles by selling appreciating stock. But calling A.I. a bubble may not be strictly correct. Credit bubbles, by definition, are fueled by excess credit creation. Housing is the model: the bank creates credit for a new buyer to buy a house (banks do not allocate credit—they create it). The new credit enables the buyer to outbid other potential buyers, which pushes the price of the house higher. The other houses in the neighborhood get rerated higher, which creates more collateral and enables banks to create more credit. Builders see the rising prices, a signal of scarcity, and devote more resources towards building more houses. Eventually price pressure from overcapacity overwhelms the credit creation, and prices begin to fall. The banks perceive that their collateral is getting less valuable—first they stop lending to new buyers, then they try to sell the mortgages they hold. With no buyers and increasing panic, prices crash.

The Magnificent Seven are not the source of the bubble because they have low (even negative) levels of net debt. They are more like CryptoPunks, receptacles of bubble cash, much like Netscape and the internet companies were in the 1990s.

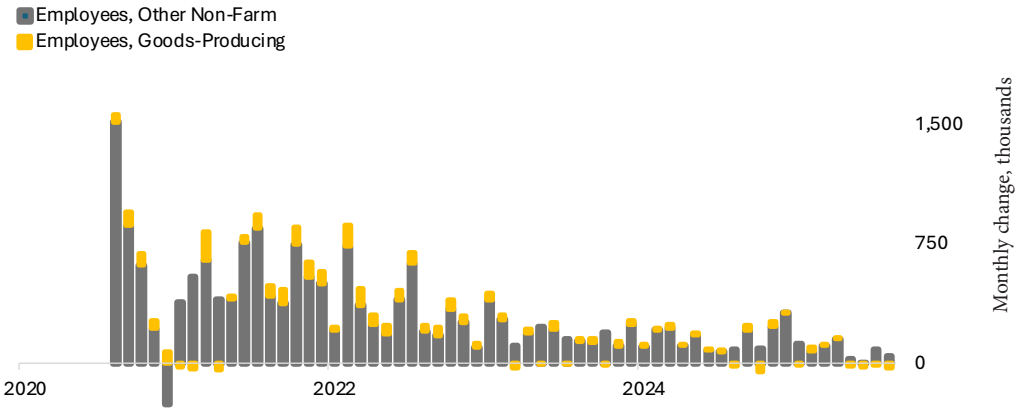
And why shouldn't they be? Unlike CryptoPunks, The Magnificent Seven have near-monopolies via scale in each of their respective spheres. These powers make the companies susceptible to state influence but also entrench their market positions. Nor is the flow of money into their shares necessarily a matter of choice. The rise of passive investing, especially via retirement accounts, which typically give workers few options as to how to allocate their capital, directs money flow straight into the indices, which are capitalization-weighted: so the more expensive the Magnificent Seven become, the more equity capital they attract.

There are mounting signals, however, that our credit-driven economy is stuttering. Housing is always the most important metric in the economy because so much of the credit system is directed towards issuing mortgages: the chart below left reveals that the median sales price is slipping, as it always does before a major recession, eating away at the main source of banking collateral, while the chart below right shows that housing inventory is creeping up to recession levels.

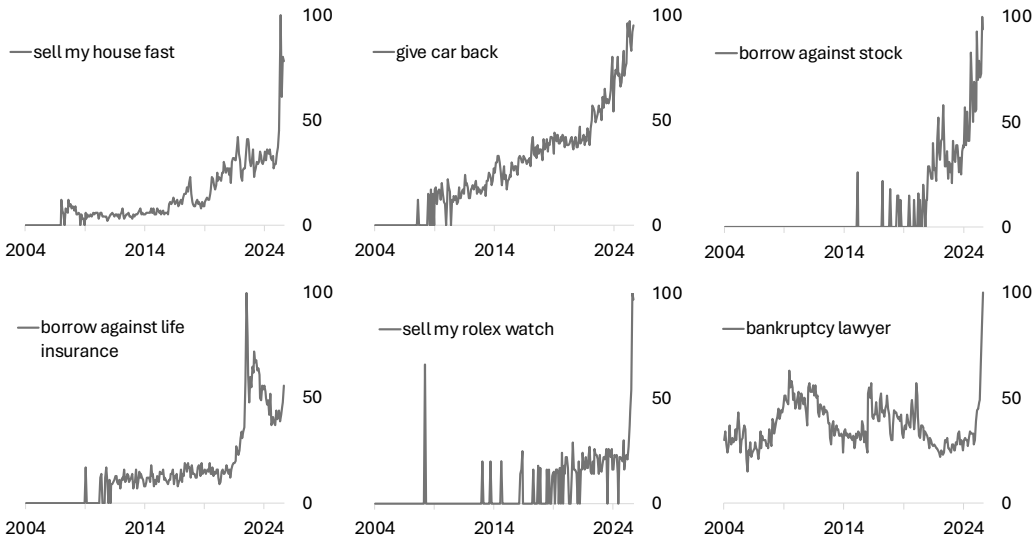


The employment numbers released last week confirm that the economy is in trouble. The headline had jobs increasing by 22,000, below 79 of 80 economists'

forecasts. The June employment number, which had initially been reported at 147,000, was revised downward to negative 13,000. Worse for Trump, employees in goods-producing sectors of the economy contracted by 25,000.



Google offers a tool that enables observing employee strife first hand: Google Trends reveal "a largely unfiltered sample of actual search requests made to Google." The samples below paint a bleak picture.



The accelerating economic slowdown puts the Fed in a bind. In his August presentation at Jackson Hole, Powell reminded his audience: "Our mandate from Congress [is] to foster maximum employment and stable prices for the American people." The problem is that "risks to inflation are tilted to the upside, and risks to employment to the downside—a challenging situation."

Not just challenging, existential. We will repeat again Ludwig von Mises's most famous passage: "There is no means of avoiding the final collapse of a boom brought about by credit expansion. The alternative is only whether the crisis should come sooner as the result of a voluntary abandonment of further credit expansion," which results in a wave of unemployment as malinvestments are liquidated, "or later as a final and total catastrophe of the currency system involved," also known as hyperinflation.

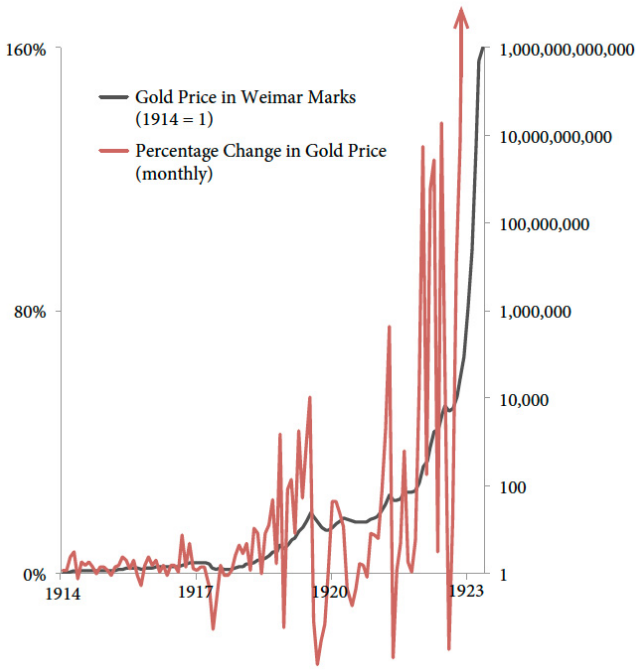
We already know which path the Fed will choose: whereas the 1920s hyperinflations remain within one generation of living memory for central and eastern Europeans, the economic and political establishment of the West is dedicated to avoiding a 1930s-style banking crisis and resulting unemployment.

Powell noted, first, that "it will continue to take time for tariff increases to work their way through supply chains and distribution networks," but that "a reasonable base case is that the effects will be relatively short lived—a one-time shift in the price level." This framing allows the Fed to ignore the inflation side of its mandate for now. With regards to unemployment: "This slowdown is much larger than assessed just a month ago, as the earlier figures for May and June were revised down substantially … downside risks to employment are rising. And if those risks materialize, they can do so quickly in the form of sharply higher layoffs and rising unemployment."[1] This is why last week's jobs report sent gold spiking higher: Powell now has no choice but to cut rates aggressively.

The S&P500 also opened higher on Friday: a lower rate environment not only lowers the discount rate applied to corporate earnings, which boosts valuations, but it reduces the cost to finance money flows into the equity market.

But stocks quickly lost ground. Oil plunged 2.4%, now down 16% from June's high. Perhaps the market remembers the 2007 debacle: the only reason the Fed was lowering rates is that conditions were already catastrophic. Trump needs a scapegoat and has been grooming Powell to take the blame: "Jerome 'Too Late' Powell should have lowered rates long ago. As usual, he's 'Too Late!'"

Gold did not follow the stock market's lead. It leapt higher and kept running. CPI inflation (which is designed to underreport inflation) stands at 2.7%, materially higher than the Fed's 2% target. Sticky Price Consumer Price Index less Food and Energy is worse, at 3.4%. The stock market is near all-time highs. M2 money supply is growing at a 4.8% annual rate, up from 3.6% at the beginning of the year. Gold and silver are in major breakouts. And the Fed is cutting rates! … because it has no choice. It appears the real crisis will come "later as a final and total catastrophe of the currency system."



Myrmikan first published the chart at right in 2019 to highlight that gold's nominal volatility tends to increase the higher it goes. The value of gold is stable, of course: there was no volatility in the USD price of gold during this time. The nominal volatility is an artifact of a dying currency.

There remain no gold standard currencies against which to display that nominal

1 https://www.federalreserve.gov/newsevents/speech/powell20250822a.htm

gold volatilities are currency artifacts, which makes gold appear to be the unstable element. But government policy cannot undo economic law: it remains true that currencies are fluctuating, not gold.

And for that reason, we are surprised that the gold price has had no significant drawdowns since the breakout in 2024. We conclude, first, that gold was greatly undervalued (or, rather, fiat currency was overvalued), and we are still in "underwater beach ball" mode. Once the gold price discovers a more appropriate level, we expect volatility to return and with vengeance.

That may mean that when the credit cycle implodes and the stock market cracks, gold will get hit as well. That is what happened in 2008 and 2020, and it would be reasonable to expect it to happen again.

But we're not so sure. First, the stock market may not need to crash. The price-to-earnings ratio of Google (Alphabet) and Meta (Facebook) are in the 20s, that of Amazon, Apple, and Microsoft in the 30s. Too high, perhaps, but nothing like the 200 PE ratio Cisco Systems boasted in 1999 nor the 150 PE ratio held by Oracle, or infinity for some of the other darling stocks.

If the stock market does crack and drags gold (and the miners) down with it, we are confident the plunge in hard assets would be short-lived, as it was in 2020. This possibility reminds us of what we wrote on March 12, 2020, when the GDXJ had fallen by 32% over thirteen trading days:

> For months and years the most pressing question for gold investors has been whether gold and gold stocks would get hit when the credit bubble pops and then run, as they did in 2008, or whether the Fed would print so much money to prevent the next crash that gold would run without dipping.... On the one hand, why should things be any different: Our credit bubble is defined by banks creating and issuing credit in dollar terms. When those debts are all called in at once, there is a massive short squeeze on dollars. The monetary base is currently $3.4 trillion, and there are around $90 trillion in dollars owed globally. When the debts become due, everyone dumps whatever assets they can to raise currency to ward off default and foreclosure, which includes gold and gold stocks.
>
> … [On the other hand] structural changes in the debt markets have made it easier for the Fed to be proactive. In the previous cycle, banks issued debt directly and then took their debt products and securitized them—when the music stopped, they were stuck with an inventory of toxic loans. Today, non-bank lenders originate a growing percentage of debt with credit they borrow from money center banks, somewhat insulating the banks from first losses. The Fed can observe funding conditions directly through the repo market and so become instantly aware of credit problems before institutions have a chance to fail.…

We now add that the banks have further insulated themselves from housing credit risk. Commercial banks hold only 20% of the $13.4 trillion in mortgage debt; government entities hold, guarantee, and securitize the balance. This means the risk is now firmly with the currency, since the government has effectively guaranteed the mortgage market.

We continued:

> [When] Myrmikan [got] into the gold space back in 2009: oil had collapsed by 80% from the peak, gold had declined 30% in nominal terms, meaning gold mining margins in gold terms were increasing. The HUI proceeded to rally 325% from the trough—many juniors rose ten fold.
>
> This time around will be better. The printing—and it will be printing this time, not QE—will cause gold to rise both in real and nominal terms. There is no better environment for gold miners.

If there is a deflationary impulse move, the Fed's response will have to be greater even than in 2020, setting gold up for an epic run.

Second, as we showed in our June letter, stocks are already crashing in real (gold) terms, making a nominal crash in the stock market less necessary.

Third, in a full blown currency crisis, like the 1997 Asian crisis, stock markets do fall along with the currency, that is, at the same time the nominal gold price rises. We suspect that Biden/Blinken's undermining of the dollar's global reserve status makes this third choice the most likely. Perhaps Friday's market action is a harbinger.

In other words, the current bubble may not be like 2008, susceptible to a deflationary crash, but is instead a currency/treasury bond bubble. The crazy prices of CryptoPunks, The Magnificent Seven, Bitcoin, Ethereum, are all symptoms of currency holders looking for a safe haven. Gold is the only true safe haven, as the central banks rediscovered in 2024, and as the broader market is rediscovering now.

Professionally we remain agnostic as to whether the next financial crisis sends gold down at first or straight up. Our mandate is to offer sophisticated investors exposure to the junior gold mining sector—which is highly sensitive to the gold/commodity ratio, which is determined by societal credit levels—as insurance against the collapse of the global credit bubble. Current events add to our confidence that our investment thesis remains intact.